

Thick Film UV Lithography Fabrication of Large Area, Fine Pitch Collimating Grids for X-Ray Astronomy

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X-Ray collimating grids a factor of two finer in pitch than have previously been available were fabricated for incorporation into the High Energy Solar Spectroscopic Imager (HESSI) for space launch in July, 2000. This technology was in part responsible for the reduction in mission cost from \$300 million to \$60 million without significant compromise in science capability. The telescope will allow the first hard X-ray spectral imaging of the Sun with approximately 2 arcsecond angular resolution. Grids of 34 and 58 micron pitch were fabricated using a three layer UV photoresist (Shipley SJR-5740) process to form patterned films of about 80 microns thickness and 88 millimeter diameter patterned area. Gold was electroplated into the photoresist film to form low stress Gold grids of a nominal thickness of 75 microns. The Gold pattern was released from the plating substrate forming a free standing Gold foil which was subsequently packaged into a circular mounting frame for incorporation into the HESSI instrument. A second design was fabricated in which individual Gold foils were stacked to form composite structures of greater thickness. Fixturing and techniques to stack, align and attach foils to an accuracy of 0.5 micron were developed and demonstrated.